UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/765,468
Applicant:	Frederick W. GIACOBBE, et al.
Filed:	January 28, 2004
Title:	FIBER COOLANT SYSTEM INCLUDING IMPROVED GAS SEALS
TC/A.U.:	1731
Examiner:	John M. Hoffman
Docket Number:	Serie 6481
Confirmation No.:	8586
Customer No.:	40582

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APPELLANTS' BRIEF

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Sir:

This Brief is filed pursuant to the Notice of Appeal filed July 17, 2007.

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1. Real Parties In Interest

The real party in interest American Air Liquide, Inc. is the assignee of the entire title and interest in and to the subject application by virtue of an assignment recorded at the U.S. Patent and Trademark Office at: Reel 014398, Frame 0379.

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2. Related Appeals and Interferences

There are no related Appeals or Interferences.

3. Status of Claims

Claims 29-39 and 47 are on appeal. As of the Office Action dated November 8, 2006, claims 29-39 and 47 were rejected. A complete copy of the current claims appears in the attached Appendix.

4. Status of Amendments

An Amendment After Filing a Notice of Appeal is being contemporaneously filed with this Appeal Brief. It cancels claim 43 and removes a superfluous semicolon from claim 32. A complete copy of the currently proposed and not-yet-entered amended claims appears in the attached Appendix.

5. Summary of the Claimed Subject Matter

The claims on appeal are directed to a method of cooling a fiber in a coolant system.

In particular, independent claim 32 is directed to a method of cooling a fiber in a coolant system. The coolant system includes a heat exchanger (Spec. pg 3, lns 18), a gas analyzer (Spec. pg 3, lns 23-25), and a controller (Spec. pg 3, lns 25-27). The heat exchanger has a hollow central tube (Spec. pg 5, lns 27-28), a fiber inlet (Spec. pg 3, lns 18-19), a fiber outlet (Spec. pg 3, lns 18-19), an internal passage disposed between the fiber inlet and fiber outlet (Spec. pg 3, lns 18-19), and first and second adjustable seals (Spec. pg 4, lns 1-3). The first and second adjustable seals partition the internal passage into a first chamber, a second chamber and a primary cooling chamber (Spec. pg 4, lns 1-3). The controller is in communication with the first and second adjustable seals (Spec. pg 4, lns 6-7) and the gas analyzer (Spec. pg 13, lns 15-18). The first chamber has an inlet port (Spec. pg 4, lns 3-4). The second chamber has an inlet port (Spec. pg 4, lns 4-7). Each of the adjustable seals is an iris diaphragm (Spec. pg 7, lns 5-11). The iris diaphragm includes a series of sliding plates that combine to form a generally circular orifice and which are selectively manipulable to increase or decrease a diameter of the orifice (Spec. pg 7, lns 5-11). The gas analyzer is in fluid communication with a withdrawal port disposed on at least one of the first, second and primary cooling chambers (Spec. pg 8, lns 24-25). The method includes the following steps. A fiber is passed through the internal passage between the fiber inlet and the fiber outlet (Spec. pg 9, lns 29-30). A first fluid medium is flowed into the first chamber via the inlet port of the first chamber (Spec. pg 9, lns 8-9). A second fluid medium is flowed into the second chamber via the inlet port of the second chamber (Spec. pg 8, lns 20-23), wherein the flow of first and second fluid mediums achieves a lowering of the fiber temperature and the first and second fluid mediums are of the same or different gas composition (Spec. pg 10, ln 11). A fluid sample is allowed to flow from the withdrawal port to flow to the gas analyzer (Spec. pg 8, lns 23-26). A concentration of a gas in the fluid sample is measured

via the gas analyzer (Spec. pg 9, 29-30; pg 11, lns 1-4). A threshold value for a concentration of the measured gas is selected (Spec. pg 11, ln 12). Based upon the measured concentration and the threshold value, at least one of the iris diaphragms is manipulated, via the controller, to selectively decrease the diameter of the iris diaphragm orifice when the measured concentration of one of the gases in the fluid sample exceeds the threshold value (Spec. pg 11, lns 10-14). Support for the above-recited subject matter is also found in Figures 1-2 consistent with the reference characters described in the Specification. Also, the foregoing recitation of sources of support for the claimed subject matter is not intended to be exhaustive such that support may be found elsewhere in the document in similar or duplicative description.

Claims 29-31, 33-39, and 47 depend from claim 32 and thus include all of the limitations therein.

6. Grounds of Rejection to be Reviewed on Appeal:

The issues presented on Appeal are:

A. Whether claims 29-39 and 47 are properly rejected under 35 USC 112, first paragraph as failing to comply with the enablement requirement.

B. Whether claims 29-35, 37-39, and 47 are properly rejected under 35 USC 103(a) as obvious U.S. Patent No. 6,789,400 ("Lu").

C. Whether claim 36 is properly rejected under 35 USC 103(a) as obvious U.S. Patent No. 6,789,400 ("Lu") in view of U.S. Patent No. 4,792,347 ("Deneka").

7. Arguments:

A) Claims 29-39 And 47 Were Improperly Rejected Under 35 U.S.C. § 112, First Paragraph As Failing To Comply With The Enablement Requirement.

35 U.S.C. §112, first paragraph (in pertinent part) states:

> ""The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same..."

An analysis of whether claims are supported by an enabling disclosure requires a determination of whether that disclosure contains sufficient information regarding the subject matter of the appealed claims as to enable one skilled in the pertinent art to make and use the claimed invention. The test for enablement is whether one skilled in the art could make and use the claimed invention from the disclosure coupled with information known in the art without undue experimentation. See *United States v. Telectronics, Inc.*, 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988), *cert. denied*, 109 S.Ct. 1954 (1989); *In re Stephens*, 529 F.2d 1343, 1345, 188 USPQ 659, 661 (CCPA 1976).

Appellants respectfully assert that the description in the Specification contains sufficient information to enable one of ordinary skill in the art to make and use the claimed subject matter, in particular, in the Specification at page 7, lines 5-11 as well as page 13, line 32 through page 14, line 4.

The Examiner has mischaracterized Appellants' statements during prosecution. Appellants have never before, and do not now, argue that Lu is non-enabling reference with respect to the issue of irises.

In their September 13, 2006 Amendment, Appellants argued that Lu's generic teaching of tailoring the "chambers and the size of the opening ... according to the geometry and operation conditions of the cooling device" does not

enable one of ordinary skill in the art to provide an adjustable seal that was manipulable. This argument was in response to the Examiner's identification of text in Lu that putatively disclosed various limitations of the claims. It is noteworthy that the Examiner did not mention irises in that identification. As previously explained in their March 8, 2007 Amendment, Appellants have very clearly stated their position: they do not argue that Lu et al. is not enabling of manipulation of an iris per se.

Thus, the Examiner has improperly construed Appellants' statements in prosecution as an Admission that their claimed iris is not enabled. The rejection should be overturned.

B) Claims 29-35, 37-39 And 47 Were Improperly Rejected Under 35 U.S.C. § 103(a) As Obvious Over U.S. Patent No. 6,789,400 ("Lu").

35 U.S.C. §103(a) states (in pertinent part):

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains..."

Appellants respectfully assert that the rejection should not be sustained because Lu teaches away from the hypothetical combination of teachings suggested by the Examiner thereby leading to the conclusion that one of ordinary skill in the art would not have been motivated to modify the teachings of Lu in the manner suggested.

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of

development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. *See United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966) ("known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness"); *In re Caldwell*, 319 F.2d 254, 256, 138 USPQ 243, 245 (CCPA 1963) (reference teaches away if it leaves the impression that the product would not have the property sought by the applicant).

Evidence supporting the legal conclusion that Lu et al. teaches away from the use of an iris in the heat exchanger disclosed therein follows. Appellants kindly direct the Board's attention to line 49 of column 8 through line 9 of column 9. One of ordinary skill would likely have considered this portion of Lu et al. at the end of the Detailed Description before the Examples to describe the various pros and cons of conventional heat exchangers versus the Lu et al. This is exemplified by the below Lu et al. text. The portion of description directed to the use of an iris in conventional heat exchangers is in italics. Text that is especially relevant to a legal conclusion that Lu et al. teaches away from the claimed invention is in bold italics. Text that describes the heat exchanger that Lu et al. proposes to use to solve the problems of iris plates is underlined.

> *In many commercial heat exchangers, the coolant is fed from the bottom through a single-chamber feed assembly. An iris plate is usually attached to the bottom of the feed assembly to restrict the egress of the coolant from the feed chamber. The diameter of the opening of the iris plate is quite small (usually between 1 and 5 mm), the gas velocity at the iris plate can reach 50 meters per second or higher, depending on the feed flow rate, cooling chamber tube diameter and length of the cooling chamber tube, as well as the iris diameter.* ***The high gas velocity through the iris plate could cause fiber vibration, which would result in fiber breakage and affect the fiber quality***.
>
> ***Another problem associated with the iris plate design is the percentage of the coolant lost from the bottom increases with the decrease of feed flow and can not be conveniently adjusted for varying flow rates***. <u>By using a double- or multiple-chambered assembly on the bottom of a heat exchanger while feeding coolant to the upper chamber and sealing gas to the bottom</u>

> chamber of a, for instance, double-chambered assembly the coolant gas loss through the fiber outlet can be greatly reduced and the sealing gas flow can be adjusted according to the feed flow. In addition, the size of the opening of the fiber outlet at the bottom chamber can be made larger than the opening of an iris plate that would be used without the expense of losing coolant from the bottom. By doing so, the linear velocity at the fiber outlet is reduced and thus the chances of fiber vibration caused by the high flow velocity is greatly reduced.

Given this text which first describes the problems of iris plates used in conventional heat exchangers and then describes how these problems are solved with the invention proposed by Lu et al., it would have been apparent to one of ordinary skill in the art that Lu et al. described use of the iris with respect to conventional heat exchangers and **not** the Lu et al. heat exchanger. Thus, the Examiner's rejection is most properly viewed as a combination of the separate disclosures of: a) the various details of the Lu et al. inventive cap assembly 1, and b) use of an iris with conventional heat exchangers.

Appellants assert that one of ordinary skill in the art at the time of the invention would have been discouraged from following the path set out in the reference because Lu et. discloses that use of an iris plate could cause fiber vibration which would result in fiber breakage and affect the fiber quality. Also, when iris plates are used, the percentage of the coolant lost from the bottom increases with the decrease of feed flow and can not be conveniently adjusted for varying flow rates.

Appellants also assert that one of ordinary skill in the art would have been led in a direction divergent from the path that was taken by the Appellants. As described by the Specification at line 29 of page 1 through line 4 of page 2, one problem relates to the escape and excessive loss of helium through the inlet and outlet ends of the heat exchanger into the surrounding atmosphere during cooling of the fiber. Keeping the loss of helium and/or other coolant gases from the heat exchanger to a minimum during operation is highly desirable to maximize cooling

efficiencies within the chamber and minimize operating costs. Thus, Appellants sought to keep the loss of helium and/or other coolant gases from the heat exchanger during operation. In contrast, Lu et al. teaches that the percentage of the coolant lost from the bottom increases with the decrease of feed flow and can not be conveniently adjusted for varying flow rates when iris plates are used.

Appellants further assert that Lu et al. teaches away from the claimed invention because it leaves the impression that the product would not have the property sought by the Appellants. As described by the Specification at line 29 of page 1 through line 4 of page 2, one problem relates to the escape and excessive loss of helium through the inlet and outlet ends of the heat exchanger into the surrounding atmosphere during cooling of the fiber. Keeping the loss of helium and/or other coolant gases from the heat exchanger to a minimum during operation is highly desirable to maximize cooling efficiencies within the chamber and minimize operating costs. Thus, Appellants sought to keep the loss of helium and/or other coolant gases from the heat exchanger during operation. In contrast, Lu et al. teaches that the percentage of the coolant lost from the bottom increases with the decrease of feed flow and can not be conveniently adjusted for varying flow rates when iris plates are used.

Because claims 29-31, 33-35, 37-39, and 47 include all of the limitations of claim 32, all of the arguments recited above as to the rejection of claim 32 equally apply to the rejection of claims 29-31, 33-35, 37-39, and 47.

Thus, for the reasons set forth above, the rejection of claims 29-35, 37-39, and 47 under 35 U.S.C. § 103(a) should not be sustained.

C) Claim 36 Was Improperly Rejected Under 35 U.S.C. 103(a) As Obvious U.S. Patent No. 6,789,400 ("Lu") In View Of U.S. Patent No. 4,792,347 ("Deneka").

Claim 36 was improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Lu et al. in view of Deneka. Because claim 36 includes all of the limitations of claim 32, all of the arguments recited above as to the rejection of claim 32 equally apply to the rejection of claim 36. Further, Deneka fails to cure the deficiency of Lu.

Thus, for the reasons set forth above, the rejection of claim 36 under 35 U.S.C. § 103(a) should not be sustained.

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8. Claims Appendix

Claims 1-28 (cancelled)

Claim 29 The method of claim 32, wherein the heat exchanger further includes a hollow outer tube disposed around the hollow central tube and defining a chamber between the outer surface of the hollow central tube and the inner surface of the hollow outer-tube, and the method further comprises:

flowing a third fluid medium through the chamber between an inlet port and an outlet port of the hollow outer tube.

Claim 30 The method of claim 29, wherein the third fluid medium comprises a fluid medium selected from the group consisting of water, one or more hydrocarbons, a substantially pure gas, a substantially pure liquid, and combinations thereof.

Claim 31 The method of claim 30, wherein the fiber is passed through the internal passage of a plurality of heat exchangers, and the temperature of the third fluid medium flowing through the chamber of at least one heat exchanger is different than the temperature of the fluid medium flowing through the chamber of at least one other heat exchanger.

Claim 32 A method of cooling a fiber in a coolant system, the coolant system including a heat exchanger, a gas analyzer, and a controller, the heat exchanger having:

a hollow central tube,

a fiber inlet,

a fiber outlet, and

an internal passage disposed between the fiber inlet and fiber outlet and

first and second adjustable seals, wherein

i) the first and second adjustable seals partition the internal passage into a first chamber, a second chamber and a primary cooling chamber,

ii) the controller is in communication with the first and second adjustable seals and the gas analyzer,

iii) the first chamber has an inlet port,

iv) the second chamber has an inlet port,

v) each of the adjustable seals is an iris diaphragm, the iris diaphragm including a series of sliding plates that combine to form a generally circular orifice and which are selectively manipulable to increase or decrease a diameter of the orifice, and

vi) the gas analyzer is in fluid communication with a withdrawal port disposed on at least one of the first, second and primary cooling chambers,

said method comprising the steps of:

passing a fiber through the internal passage between the fiber inlet and the fiber outlet;

flowing a first fluid medium into the first chamber via the inlet port of the first chamber;

flowing a second fluid medium into the second chamber via the inlet port of the second chamber, wherein the flow of first and second fluid mediums achieves a lowering of the fiber temperature and the first and second fluid mediums are of the same or different gas composition;

allowing a fluid sample from the withdrawal port to flow to the gas analyzer;

measuring a concentration of a gas in the fluid sample via the gas analyzer

selecting a threshold value for a concentration of the measured gas; and

based upon the measured concentration and the threshold value, manipulating at least one of the iris diaphragms, via the controller, to selectively

decrease the diameter of the iris diaphragm orifice when the measured concentration of one of the gases in the fluid sample exceeds the threshold value.

Claim 33 The method of claim 32, wherein a composition of the first fluid medium is the same as the second fluid medium.

Claim 34 The method of claim 32, wherein a composition of the first fluid medium is different than a composition of the second fluid medium.

Claim 35 The method of claim 32, wherein:

the first fluid medium comprises a fluid medium selected from the group consisting of helium, neon, argon, krypton, xenon, hydrogen, nitrogen, carbon dioxide, and mixtures thereof; and

the second fluid medium comprises a fluid medium selected from the group consisting of helium, neon, argon, krypton, xenon, hydrogen, nitrogen, carbon dioxide, and mixtures thereof.

Claim 36 The method of claim 35, wherein the second fluid medium further comprises another fluid medium selected from the group consisting of a silane, a phosphine, fluorine, chlorine, gaseous organometallic compounds, and mixtures thereof.

Claim 37 The method of claim 32, wherein the second fluid medium comprises a fluid medium selected from the group consisting of helium, hydrogen and a mixture of hydrogen and helium.

Claim 38 The method of claim 32, wherein the first fluid medium comprises a fluid medium selected from the group consisting of argon, carbon dioxide, and a mixture thereof.

Claim 39 The method of claim 32, wherein the fiber is passed through a plurality of the heat exchanger of claim 32, and the second fluid medium that is flowed into the second chamber of at least one of the plurality of heat exchangers is different than the second fluid medium that flows into the second chamber of another one of the plurality of heat exchangers.

Claims 40-42 (canceled)

Claim 43 The method of claim 32, wherein the one or more gases whose concentration is measured by the gas analyzer is selected from the group consisting of oxygen, nitrogen and carbon dioxide.

Claim 44-46 (canceled)

Claim 47 The method of claim 32, wherein the fiber is an optical fiber.

Claims 48-49 (canceled)

9. Evidence Appendix

None.

10. Related Proceedings Appendix

None.